LED Parking Lot and High-Performance Parking Structure Performance Lighting Specifications

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Developed by the U.S. Department of Energy's Commercial Building Energy Alliances (CBEAs)

- Started with the Retailer Energy Alliance, but other alliances are supporting the specifications
- Focus: Energy savings and lighting quality
- CBEA members are excited but cautious about LED technology (long-term performance is unproven)
- Performance vs. product spec

Retailer Energy Alliance

Commercial Real Estate Energy Alliance

Hospital Energy Alliance

LED Parking Lot Specification

- Intended to specify performance and related characteristics of a good-quality LED parking lot
- Covers
  - System performance lighting (energy, illuminance, light loss)
  - Submittals
  - Product (source, luminaire, ballast/driver) requirements
  - Control requirements
  - Warranty

Power Density Limits

	CBEA Spec	Std. 90.1-2010	Title 24-2008
Lighting Zone 1	0.04 W/sf	0.04 W/sf	0.036 W/sf
Lighting Zone 2	0.05 W/sf	0.06 W/sf	0.045 W/sf
Lighting Zone 3	0.06 W/sf	0.10 W/sf	0.092 W/sf
Lighting Zone 4	0.08 W/sf	0.13 W/sf	0.115 W/sf

Illuminance Requirements

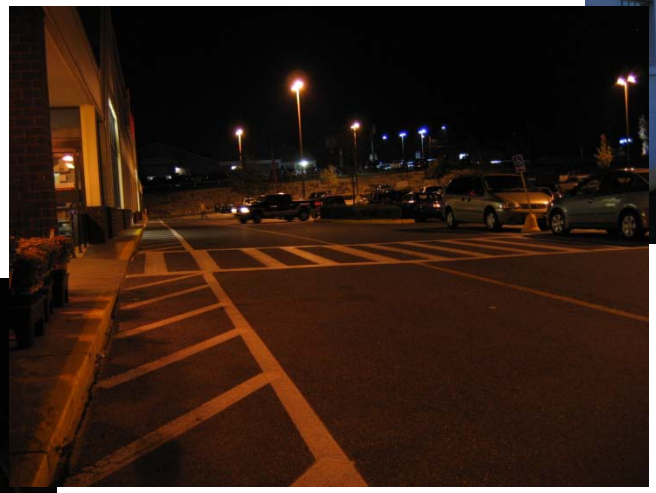
Main Parking Area		
Ambient Condition	Horizontal Illuminance	Vertical Illuminance
Lighting Zone 0	N/A	N/A
Lighting Zone 1	N/A	N/A
Lighting Zone 2	0.50 fc	0.25 fc
Lighting Zone 3	0.75 fc	0.40 fc
Lighting Zone 4	1.00 fc	0.50 fc

Notes:

1. Values in table are minimum values
2. Horizontal illuminance is on the parking surface
3. Vertical illuminance is taken 5 feet above finished grade (AFG)

Other Parking Lot Areas

Loading/Rear Drive



Front Aisle

Perimeter Parking

Illuminance Requirements

Other Parking Lot Areas			
Ambient Condition	Perimeter Parking	Front Aisle	Entry Drives, Loading Areas, Rear Drives
Lighting Zone 0	N/A	N/A	N/A
Lighting Zone 1	N/A	N/A	N/A
Lighting Zone 2	0.20 fc	1.00 fc	0.20 fc
Lighting Zone 3	0.40 fc	1.50 fc	0.40 fc
Lighting Zone 4	0.50 fc	2.00 fc	0.50 fc

Notes:

1. Values in table are minimum values
2. Horizontal illuminance is on the parking surface

Specification Overview

Warranty

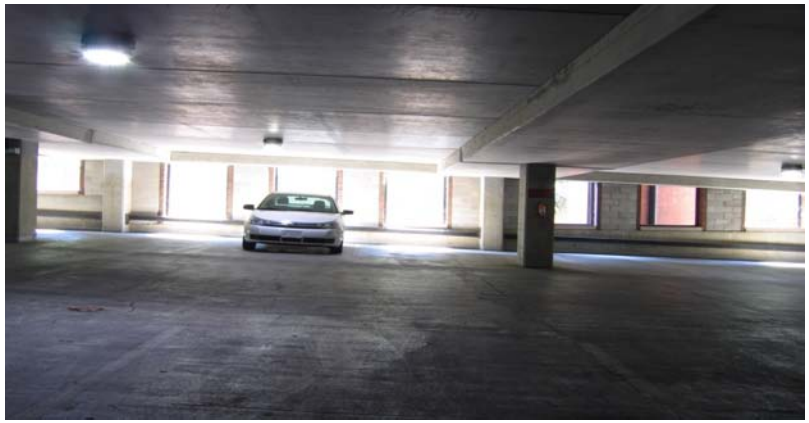
- Retailers nervous about investing without sufficient warranty
- Industry moving toward 5-year warranty
- Warranty should cover both light output and color

5 minimum

10 optional

High Performance Parking Structure

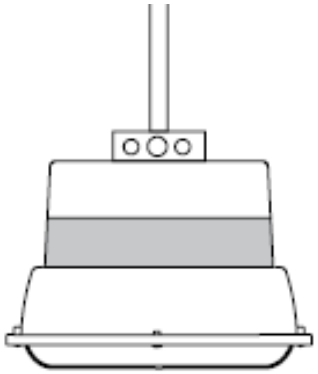
- Requested by commercial developers to have something similar to parking lots
- Started in May 2009 — expected to be finalized in 2010
- Supports capture of 24/7 savings and control savings (daylighting/occupancy sensors)
- Financial incentives available
- Covers similar requirements as LED parking lot spec



Specification — Possible Sources

- Specification addresses multiple possible technologies
- Provides technology-specific requirements where appropriate

Fluorescent



Induction

LED

Specification — Parts of the Parking Structure

Vehicle Entry

Covered Parking

Top Deck

Specification
Illuminance Requirements

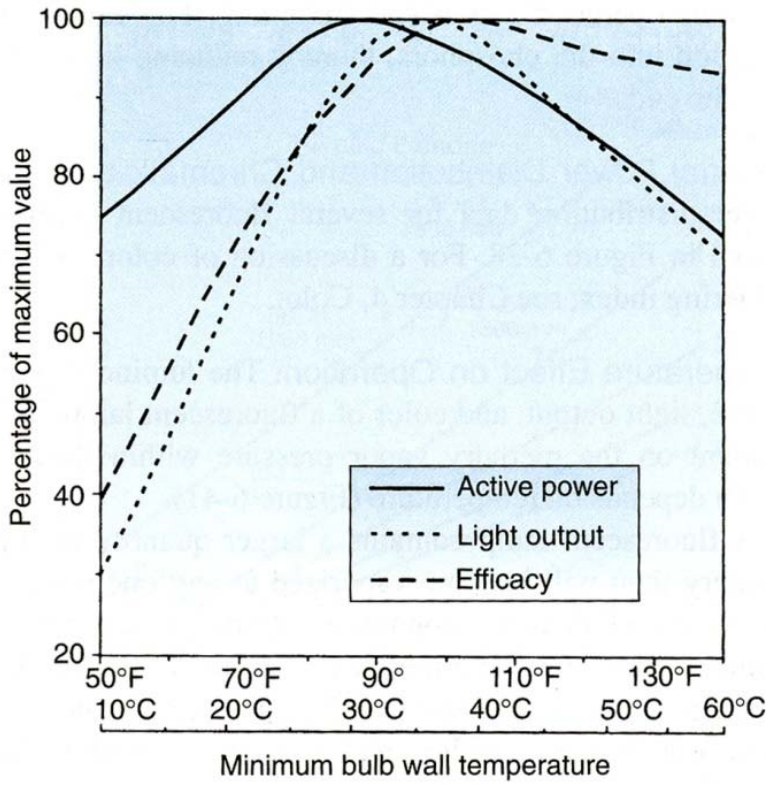
Parking Areas				
Area	Minimum Horizontal Illuminance	Minimum Horizontal Illuminance	Uniformity Max:Min	CV
Covered Parking Area	1.25 fc	0.5 fc	7:1	0.38
Ramps	1.25 fc	0.5 fc	10:1	0.41
Vehicle Entry/Exit (Day)	50.00 fc	25.0 fc	10:1	0.41
Vehicle Entry/Exit (Night)	1.25 fc	0.5 fc	10:1	0.41
Uncovered Parking Area (Top Deck)	0.75 fc	0.4 fc	10:1	0.41

Notes:

1. Measured on the parking surface, absent the cars
2. Vertical measurements shall be taken 5 feet (1.5 m) vertically
3. Contributions from the sun should be factored into these values

Specification Temperature

- "Cold" affects fluorescent (FL) and induction (IND)
- Locations with many days of low temperatures are considered cold
- Spec assumes 20% reduction in output for FL and IND
- Spec gives boost to LEDs in "cold" → 0.25% per 1° C below 25° C



Specification Controls

- Daylighting harvesting
  - Luminaires within 20 feet of perimeter if wall is open 40%+
- Occupancy sensors
  - Bilevel (hi/low) or on/off for luminaires in interior
- Parallels proposal in ASHRAE Standard 90.1-2010

Specification Economic/Payback

EPAct 1992 incentives

- Sliding scale reductions for property taxes
- $0.30/sf when lighting is 0.225 W/sf
- $0.60/sf when lighting is 0.18 W/sf
- Applicable to covered floors only — not open-to-sky top floors
- Extended from expiring in 2009 to December 31, 2013
- Government structures $$ → design team

Resources

- Commercial Building Energy Alliances (CBEA)
  - http://commercialbuildings.energy.gov/alliances/
- LED Parking Lot Specification
  - http://www1.eere.energy.gov/buildings/alliances/rea_subcommittees.html
- High Performance Parking Structure Specification
  - http://www1.eere.energy.gov/buildings/alliances/training.html
- DOE CALiPER Program (product test data — round 10)
  - http://www1.eere.energy.gov/buildings/ssl/caliper.html

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